MA82r
8C21360
NMNS

RESERVED/RÉSERVÉ

NOT TO BE TAKEN FROM THE ROOM
POUR LA CONSULTATION SUR PLACE

LIBRARY / BIBLIOTHÈQUE
National Museum of Natural Sciences
Musée national des sciences naturelles
P.O. Box 3443, Station D
Ottawa, Ontario
K1P 6P4 CANADA

OCT 31 1989

BIOME

A publication of the National Museum of Natural Sciences

Vol. 9:3 1989 ISSN 0712-9319

Off the Press:

The Dinosaurs of North America

An Odyssey in Time: The Dinosaurs of North America
Dale A. Russell
Paintings by Eleanor Kish
Photographs by Harry Foster

240 pp. Colour illustrations
ISBN 0-8020-5815-9
23 × 30 cm
$45.00 (HB)

Édition française:
Une odyssée dans le temps: les dinosaures de l'Amérique du Nord
ISBN 2-89000-240-3

"The setting Sun enhances the red soils and the red dust on the leathery fronds on cycad-like plants. A young *Tenontosaurus* nestles its body into warm sand, partly sheltered by roots dangling down from the eroding bank overhead. A small carnivore darts across the stream bed, and the force of the collision of the bodies of the two animals pins the young herbivore, struggling to rise, against the stream bank. The carnivore slides the claws of its hands into the back of the tenontosaur and seeks to immobilize the flailing head in its jaws. Using the weight of its body to pull the herbivore to one side, it rips out the viscera with alternating rakes of the curving talon on the inside of each foot. The writhing slowly abates, as viscera are coated with dirt and bright red blood coalesces into sandy balls. The sunlight vanishes, and the small carnivore (*Deinonychus*) releases its prey and begins to devour the interior of the body cavity. Radiant energy from a star, the Sun, having been captured by green plants whose foliage was consumed by a herbivorous dinosaur, flows into the body of a carnivore in a ecological process that can be described with numbers by a myopic paleontologist many tens of millions of years later. This act of energy flow, endlessly consummated in nature, epitomizes the marvel and horror of the living world."

This dramatic scene is excerpted from *An Odyssey in Time: The Dinosaurs of North America* by Dr. Dale Russell of the Museum's Paleobiology Division. It conveys some of the flavour of the book, which attempts to give us a more accurate picture of these ancient animals without destroying any of their mysterious appeal.

Dinosaur. The word did not even appear in our dictionaries until a little more than a hundred years ago, yet today even kindergarten children know these reptiles once ruled the earth. Millions of years after their extinction, dinosaurs live again in museum reconstructions, books, films, cartoons, toys, greeting cards, posters and t-shirts. Dinosaur themes and motifs have become an enduring element in our popular culture.

Most of us think we know something about dinosaurs, but we still have many misconceptions. One of the most common is that they were all skyscraping hulks like the infamous *Tyrannosaurus* with its fearsome mouthful of dagger-like teeth. Some dinosaurs were indeed huge: a gigantic vertebral fragment found in southern Colorado may have come from a dinosaur weighing 100 tonnes. But others were diminutive: *Nanosaurus*, a plant-eating biped, was only half a metre long and weighed 0.75 kg, hardly more than an arctic ground squirrel.

Such misconceptions are dispelled in Russell's book. *The Dinosaurs of North America* is the most comprehensive summary of our accumulated scientific knowledge about dinosaurs yet published. The book concentrates on North America because the fossil record of dinosaurs is more complete and has been more thoroughly studied here than on any other continent. The author covers the map, describing finds from sites in Massachusetts, where a dinosaur footprint was first found in 1800, in Nova Scotia, British Columbia, California, Mexico and the Yukon. Dinosaur fossils have even been found in the north slope region of Alaska, which was only 1000 km from the North Pole toward the end of the "Age of Dinosaurs" 63 million years ago. Although the book focuses on North America, dinosaurs are explained in their global context, and North American fossil records are related to those of other continents.

Russell tells the reader how dinosaurs lived — what they ate, where they lay their eggs, how they protected themselves and their young, how they moved, who their enemies were. Some of the other fauna that shared the dinosaurs' world are also examined, such as *Quetzalcoatlus*, a gigantic flying reptile from western Texas that may have had a wing span of 15 m.

Russell explores a wide range of theories about dinosaurs. Were some dinosaurs at least incipiently warm-blooded? Did they give birth to live young? Did dinosaurs migrate between North America and Asia using a land bridge that joined these two continents? Was the extinction of dinosaurs caused by a comet striking the Earth? (The impact could have released energy 10,000 times more destructive than the simultaneous detonation of all existing nuclear weapons.) Dinosaurs were developing bigger brains before they became extinct. What if this process had continued? Would there now be dinosaur humanoids?

The book's magnificent art — 15 paintings by Eleanor Kish reproduced in full colour along with 111 colour photographs and 12 colour maps — adds immeasurable impact. Eleanor Kish is an internationally acclaimed artist whose work has been commissioned by galleries and museums around the world. According to Russell, the success of Kish's dinosaur paintings can be attributed to their close collaboration. The artist and the scientist approached the subject as if it were a forensic reconstruction.

Eleanor Kish is an internationally acclaimed artist.

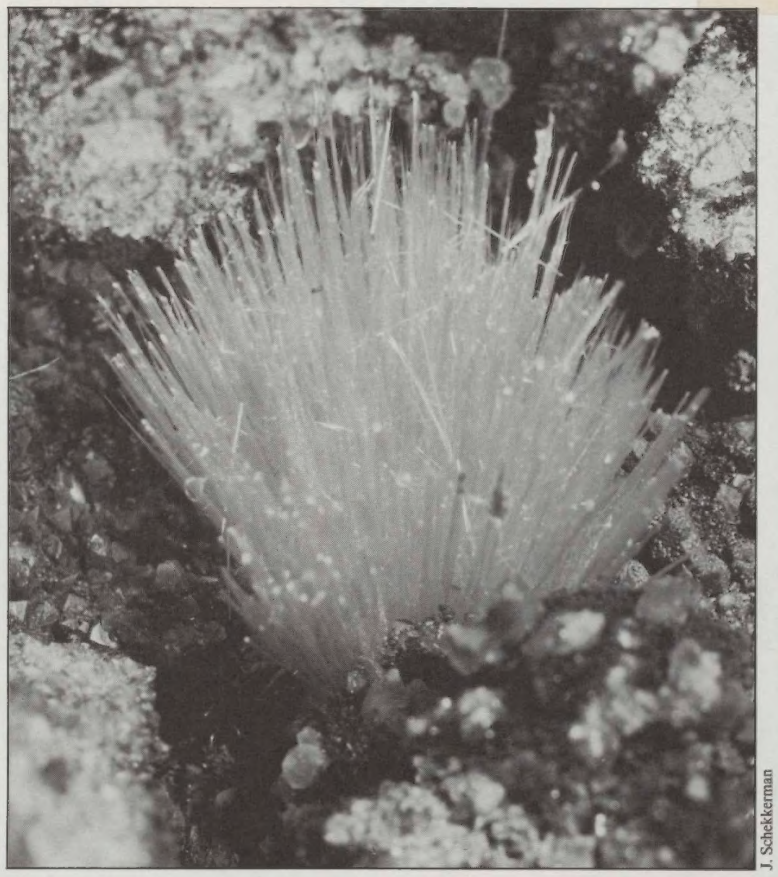
An Odyssey in Time: The Dinosaurs of North America re-creates a long-lost world and leads us to ask some rather searching questions about our own.

Famous Mineral Localities of Canada

Famous Mineral Localities of Canada
Joel D. Grice

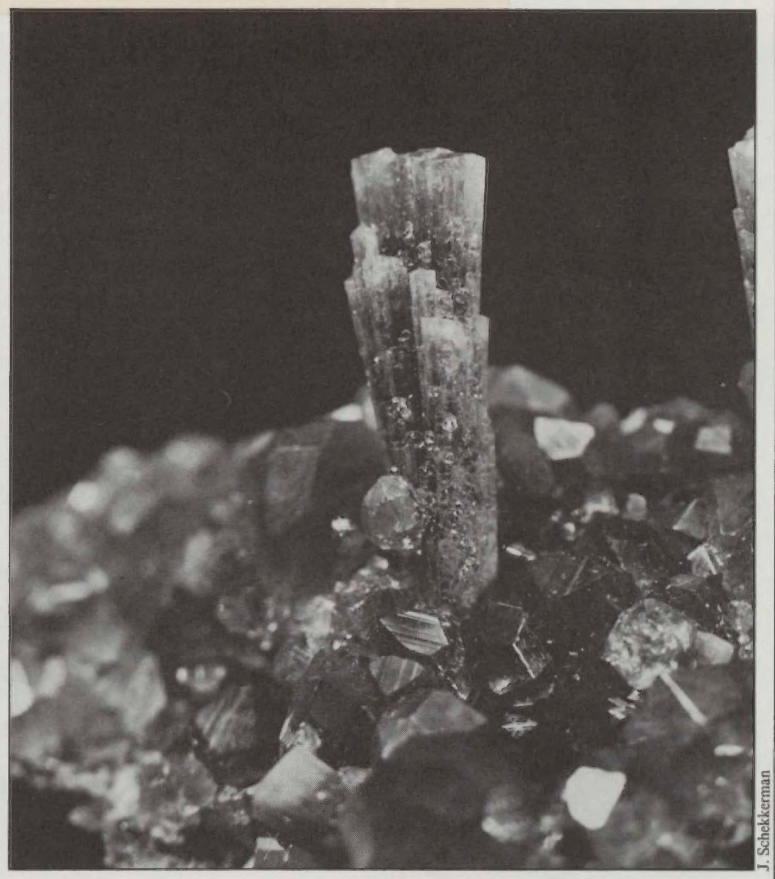
190 pp. Colour illustrations
ISBN 0-88902-898-2
18 × 25 cm
$35.00 (HB)

Édition française:
Sites miniers célèbres du Canada
ISBN 088902-592-4



J. Schekkerman

Uranophane from the Madawaska mine, Bancroft, Ontario. Collectors regard the Madawaska mine as a classic locality for this mineral.



J. Schekkerman

Diopside crystal on grossular garnet crystal, from Asbestos, Quebec.

"Summer 1897. One year after the discovery of gold by Carmack on Bonanza Creek and Henderson on Gold Bottom Creek, the rush was on. Of the hundred thousand men and women who left their homes to seek their fortunes on the Yukon gold trails only forty thousand determined souls survived the formidable hardships and reached Dawson. About half of them actually prospected in the fields and of these a mere handful realized their dream of riches; but all of these characters, some more famous than others, played a role in the great Klondike gold rush."

Canada is particularly rich in mineral and fuel resources — and not just gold. Almost a third of the total value of our exports is based on these commodities. Canada has become the Western World's leading producer of nickel, zinc, asbestos and nepheline, and the second largest producer of tantalum, silver, uranium, columbium, selenium, gypsum, molybdenum, potash and titanium.

In *Famous Mineral Localities of Canada*, Dr. Joel Grice of the Mineral Sciences Division tries to promote an understanding of some of the basic concepts of mineralogy and geology by discussing some Canadian minerals and their provenance. This book, however, is not just another textbook. Grice conveys a wealth of factual information in an easy, informal style. This book will interest not only professional mineralogists, but also amateur "rockhounds" and anyone who is interested in our most important natural resources.

Out of the hundreds of mineral localities in Canada, Grice has chosen nineteen of the most famous. These 19 sites represent a wide range of mineral types, geological environments and economic uses. The book covers the entire country, from Nova Scotian amethyst beds to Yukon gold streams. Grice describes the properties of well-known minerals like nickel and asbestos, as well as the more exotic deposits like lapis lazuli. Half of the 94 illustrations are in full colour.

Famous Mineral Localities of Canada also features a glossary of technical terms, a list of chemical symbols and names, a comprehensive bibliography and a detailed list of minerals by locality.

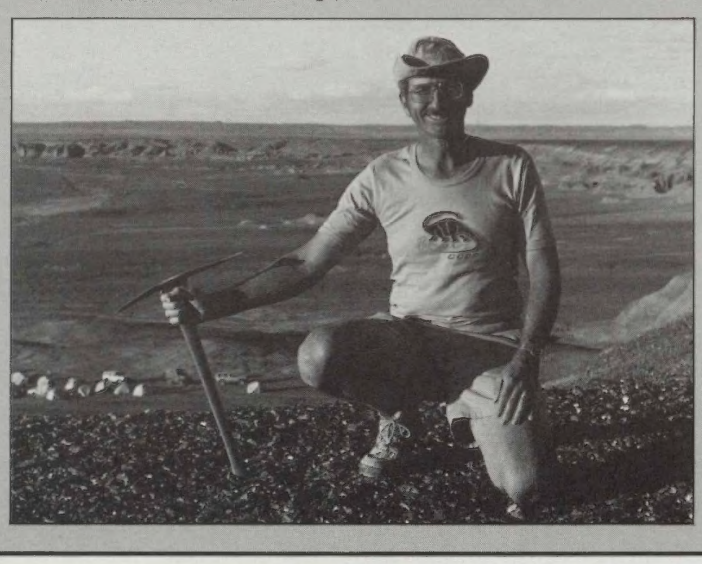
An Odyssey in Time: The Dinosaurs of North America is co-published with the University of Toronto Press, and *Famous Mineral Localities of Canada* with Fitzhenry & Whiteside Ltd. Both will soon be available in bookstores nationwide.

J. Schekkerman

Agate from Cape Split, Nova Scotia. Nova Scotian agates rival any in the world for interesting patterns, making excellent stones for jewellery.

About our Authors

Dale Russell is one of the world's leading authorities on dinosaurs. Born in San Francisco, he has spent most of his professional career with the National Museum of Natural Sciences. He has travelled the world on the trail of dinosaurs: he has dug for fossils in North America, Africa and Asia, most recently in China as part of a joint Chinese-Canadian expedition exploring northern China for remains of these ancient reptiles. He has collaborated with the United States National Aeronautics and Space Administration and the European Space Agency in their studies of the evolution of intelligence. His earlier book, *A Vanished World: The Dinosaurs of Western Canada*, has become the standard guide to an area of North America famous for its fossil record. Dr. Russell has been the Museum's Curator of Fossil Vertebrates since 1965.



John Evans Photography Ltd.

Joel Grice has been Curator of Minerals since 1976. Born in Toronto, he was an assistant professor at Acadia University, Nova Scotia, and a research mineralogist for the Manitoba Mines Branch before joining the National Museum of Natural Sciences. He has since led major field expeditions in Nova Scotia, Ontario, British Columbia, the Yukon, Baffin Island and Greenland. In 1981, he completed a five-year project to reorganize and recatalogue the Museum's vast collection of 100,000 minerals and 4500 gemstones. His research activities have included the development of a new technique for analysing mineral samples smaller than the human eye can perceive, which has earned the Mineral Sciences Division an international reputation for identifying new mineral species. Dr. Grice has recently had a new alkaline rock, *Griceite*, named in his honour.

BIOME

Editor-in-Chief:
Nick Bélanger

Acknowledgements:
Norman Bloom
Annie J. Ollivier

Art Direction:
Design and Technical Operations Division, NMNS

Graphic Design:
Acart Graphic Services Inc.

Illustrations:
Francis Chan
Charles Douglas

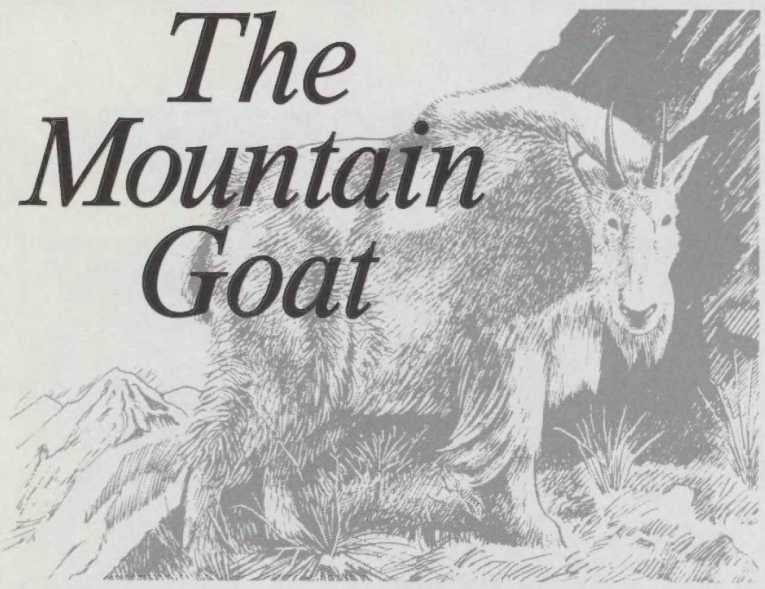
Cette publication est également offerte en français

Comments and questions should be directed to:

BIOME
National Museum of Natural Sciences
P.O. Box 3443
Station D
Ottawa, Ontario
K1P 6P4

© National Museum of Natural Sciences, 1989

The Mountain Goat



From its windswept haunts in the remote cliffs of the Rockies, the mountain goat (*Oreamnos americanus*) may seem like one of our more mysterious mammals. Although it is found at lower elevations on the British Columbia coast, it prefers craggy mountain slopes, up to the limits of vegetation at about 2400 m.

To live in this rugged terrain, the mountain goat has climbing skills that few other animals can match. Deliberately, but with the greatest of ease, it climbs rocky cliffs and threads along narrow ledges at heights that would make all but the most courageous human tremble.

A member of the same group of horned ungulates that contains domestic goats and sheep, the mountain goat's nearest relatives are the exotic goral and serow of Asia and the chamois of Europe.

In some ways, with its white beard, stocky body, high shoulders and stiff-legged walk, the mountain goat is reminiscent of a hunched-up old man carrying a great burden. It is completely white except for its nostrils, eyes, hooves and horns. The black horns are curved near the tips. With points as sharp as stilettos, they provide a good defence against attackers. Males have longer horns than females and are quite a bit larger; males stand 106 cm at the shoulder and weigh 85.3 kg compared with the female's height of 95 cm and weight of 61.5 kg.

In winter the mountain goat is protected by a soft woolly undercoat and an outer coat of long silky white fleece. Sometime in May the goat begins to shed its shaggy outer coat in patches, and may look quite scraggly until it dons its short summer coat.

Mountain goats are most active during the day, but even then they spend much of their time dozing, chewing their cud and lazily surveying their surroundings. In spring and summer small bands of goats trek to alpine meadows to take advantage of natural salt licks and feed on grasses, shrubs and alpine plants. They do not migrate in winter, but abandon some of the snowiest mountain slopes to find vegetation on steeper, more exposed ledges.

The main predators of the mountain goat are eagles and mountain lions. Although grizzlies, wolves or wolverines sometimes attack mountain goats in alpine meadows or valleys, they are safe if they can reach a cliff.

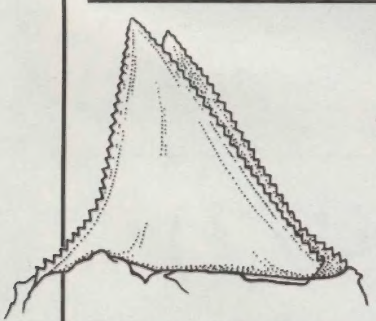
Adult mountain goats occasionally grunt or bleat, but they are more likely to act out their displeasure by stamping their forefeet and flicking their tongues. Billies are usually more peaceful than nannies and are easily dominated by them. The tables are turned in the November rutting season, however, and mating begins with the billy approaching the nanny from behind and giving her a swift kick in the flanks! During rutting season billies also sit on their haunches like dogs and use their front feet to paw the ground and cover themselves with dirt.

Kids are born, usually one to each female, from late May to mid-June. At birth they are snowy white, with large eyes, perky ears and two leathery black spots where the horns will grow. They nurse often, wiggling their tails like domestic lambs, and are not weaned until they are six weeks old. Young kids are especially vulnerable to attack by Golden Eagles, and press themselves into their mother's flanks whenever one flies overhead.

Kids spend their first winter close to their mothers, but are rebuffed by the mother the following spring before the birth of her new kid, and must follow her at a greater distance during the second summer. Females mature sexually at 27 months and males at 39 months. These fascinating mammals may live to be 12 years old in the wild.

Carol Thiessen
Exhibits Division

The Real Jaws



The Fish Section of the Museum has recently received two teeth of the fossil shark, *Carcharodon megalodon*, courtesy of Professor D. Max Blouw, St. Francis Xavier University, Antigonish, Nova Scotia. These teeth were picked up by scallop draggers on Georges Bank off Nova Scotia in the 1960s.

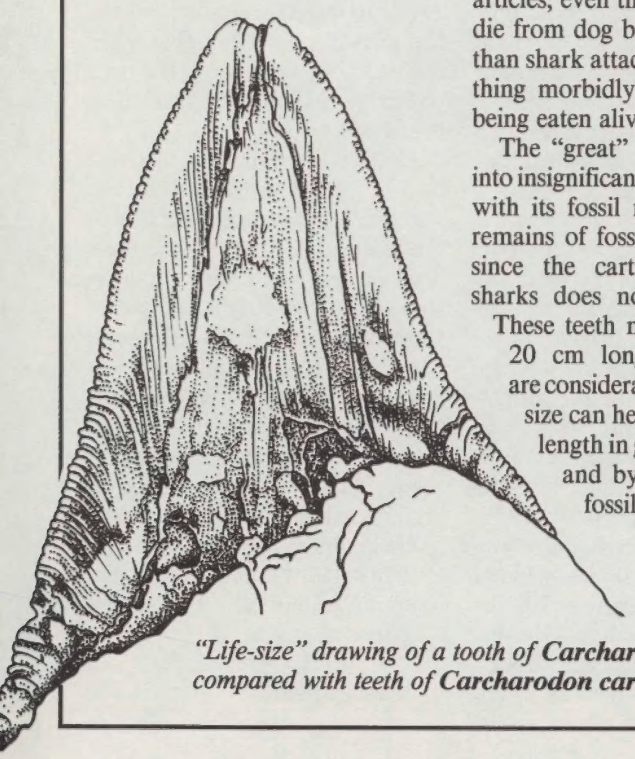
This shark is a relative of the great white shark, *Carcharodon carcharias*, which is a summer visitor to Canadian waters that can attain 6 m in length. A 5.2 m great white was caught near Prince Edward Island in 1983. Stories of great white sharks swallowing people whole in tropical waters are a favourite theme of sensational articles, even though more people die from dog bites and bee stings than shark attacks. There is something morbidly fascinating about being eaten alive.

The "great" white shark pales into insignificance when compared with its fossil relative. The only remains of fossil sharks are teeth since the cartilage skeleton of sharks does not fossilize easily. These teeth may be more than 20 cm long, although most are considerably smaller. Tooth size can help determine body length in great white sharks, and by extrapolation, in fossil sharks. A fossil tooth of 12 cm gave a body length of more than 13 m. The larger of the two teeth donated by Professor Blouw is 10.7 cm long.

The heyday of *megalodon* was in the Miocene Epoch, 10 to 25 million years ago. These giant sharks may have evolved to feed on seals, porpoises and whales since their fossilized teeth are abundant in places where there are fossil bones of these marine mammals bearing tooth marks.

But is *megalodon* extinct? Large teeth from the South Pacific Ocean have been dredged up and found to be coated with manganese dioxide. This chemical accumulates at a known rate on sea floor deposits and its thickness on one tooth indicates that the tooth had lain there for a maximum of 11,333 years, contemporary with modern man. Modern great whites are a visible species, attacking seals (and seal-like humans in wet suits) and feeding on whale corpses. The fossil great white seems to have had a similar diet and would still be a very noteworthy visitor to shores where seals and whales are found. It is most probably extinct but there is a slight chance our ancestors knew this creature.

Brian W. Coad
Zoology Division



"Life-size" drawing of a tooth of ***Carcharodon megalodon*** *compared with teeth of* ***Carcharodon carcharias.***

From the Director's Desk:
What's in a Name?

Our museum began as part of the Geological Survey of Canada in 1842, and was called the Geology Museum for many years. It has also been called the Museum of Natural History and the National Museum of Canada. Most recently we have been known as the National Museum of Natural Sciences, and soon we will be called the Canadian Museum of Nature.

Names are important. People use them to classify and remember things. They have meanings attached to them and once understood, they tend to conjure up a certain image in a person's mind.

The original Geology Museum housed primarily rocks, minerals, ores and fossils, all of which had been collected in the routine operations of the Geological Survey of Canada. Soon, however, it began to display other aspects of natural history — including birds, mammals, insects and plants — things that the scientists happened to collect along with the geological samples. Even artifacts from native peoples began showing up in the Museum. The Museum had outgrown its original name — geology — and thus became known for what it was, a full-fledged natural history museum spanning the full range of the earth sciences, zoology, botany and anthropology.

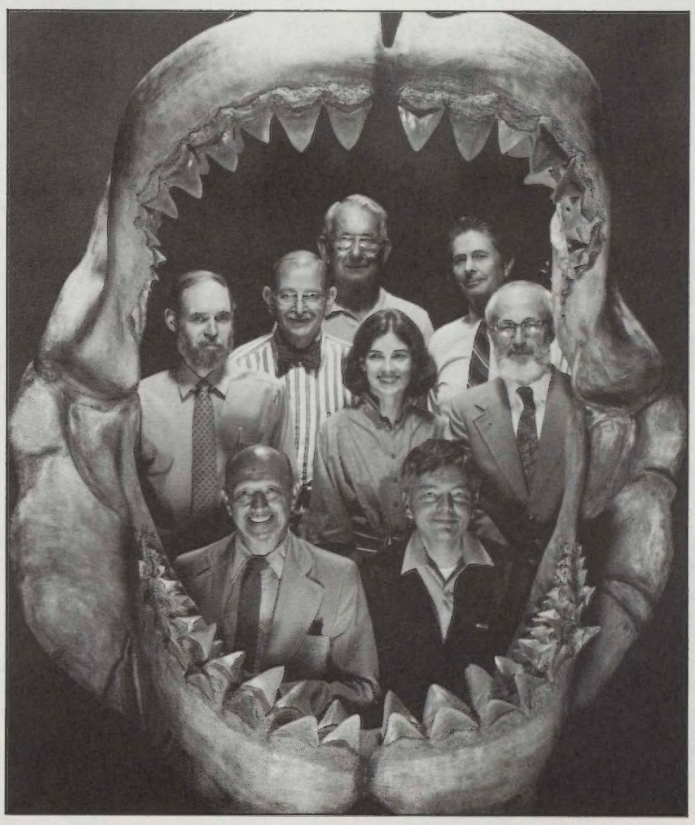
Then in 1927, a political decision resulted in a new name: the National Museum of Canada. The name was no longer just a reflection of what the Museum contained, but a title for its mandate. The Museum was to represent Canada to the rest of the world. Furthermore, it was to represent all aspects of the country: its natural history, human history, art and technology. Under this name, and the directive it implied, the Museum grew by leaps and bounds, rapidly outstripping the facilities and resources it had.

By 1968 the Parliament of the day decided we needed four museums: the National Gallery, the National Museum of Man, the National Museum of Science and Technology, and the National Museum of Natural Sciences. All of the museums, however, were to be under the authority of a single umbrella Crown corporation. Over the years, the growth of the umbrella corporation at the expense of the museums created many problems. All the museums were straining to have separate identities and a much greater degree of autonomy. In response to this pressure, both internal and external, the government created a task force. Its conclusion: dissolve the umbrella corporation and create four completely separate museums. By doing this, each museum would have a chance to express its individual character, powers and objectives in the legislation.

Our museum has been confused with the Museum of Science and Technology: both have the word science in their names. Also, because we do not have an anthropology section, we are not a full-fledged natural *history* museum. We are entirely devoted to *nature*, hence the new name that we are soon officially adopting: the *Canadian Museum of Nature*.

Our new name implies many things, but most important it directs the Museum to represent the natural world — with special, although not exclusive, attention to Canada — so as to increase knowledge, appreciation, respect for and interest in nature. Our underlying objective is to help people understand nature so as to create a healthy balance between man and nature.

Alan R. Emery
Director



Chip Clark, Smithsonian Institution

Staff of the National Museum of Natural History, Smithsonian Institution, behind "The Real Jaws."

Viola MacMillan:

Museum Strikes a Vein of Generosity

Viola MacMillan always did appreciate the finer things in life.

MacMillan, one of this country's first female prospectors, made her fortune, and her reputation, through her uncanny instinct for finding gold.

At 87, MacMillan is still active in mining — and still has her connoisseur's eye for the rare and valuable. Last May, MacMillan made it possible for the Museum to purchase the William Pinch Collection of minerals, considered by many experts to be the finest private collection of minerals in the world.

MacMillan's donation consists of $1 million spread over four years plus a $250,000 bequest. Added to the donations and pledges already made by more than 250 corporate and individual sponsors, her contribution brings the total collected for the fund to more than $5 million, the purchase price of the collection.

The Museum is preparing plans for a new minerals gallery. In appreciation of MacMillan's donation, the new gallery will be named after her.

The fundraising drive to buy the Pinch Collection is the first time the Museum has tried to raise a significant amount of money from the private sector. The project brought an enthusiastic response from the mining sector. MacMillan herself told *The Northern Miner*. "I love the industry and I am happy to do something worthwhile for mining."

Viola Rita Huggard was born on her family's farm near Windermere in the Muskoka district of Ontario. The thirteenth of fifteen children, she had to work hard from an early age. She developed the physical and mental toughness that was to serve her well later.

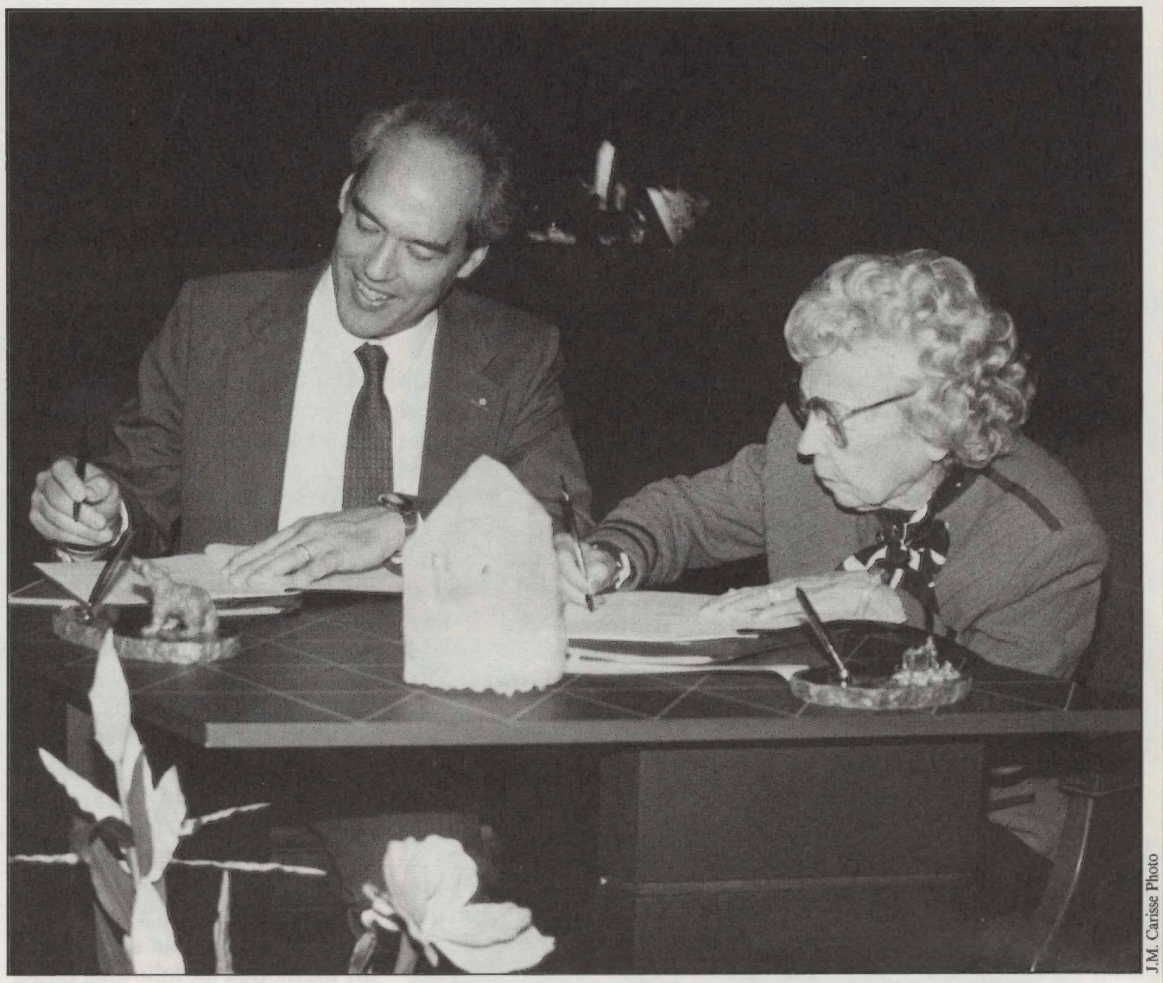
In 1923 she married George MacMillan, a member of a prominent prospecting family. In 1927, an uncle who had staked some claims in Northern Ontario asked the young couple to check them out. George and Viola plunged enthusiastically into the bush. Living conditions were primitive; Viola had to put up with wild animals barging into her cabin, not to mention even wilder fellow prospectors. The dangers and hardships however, did not deter the MacMillans. By the 1930s their hobby had become a full-time business. They prospected all over the country, often spending eight months of the year in the field.

During the Second World War, Viola MacMillan helped Canada locate the strategic metals necessary for developing atomic weapons. She almost single-handedly persuaded the government to undertake a massive training program for prospectors of strategic metals.

For more than three decades, she played a pivotal role in the development of the Canadian mining industry. She was President of the Prospectors and Developers Association of Canada for 22 years.

MacMillan would probably find much in common with William Pinch, the New York mineralogist who has devoted his life to collecting the world's finest mineral specimens. Pinch began his collection at the age of seven, when he found a fossil in a field. Over the next forty years, he travelled the world to add to his treasure trove.

The 16,000 items in his collection include gem and mineral specimens of incomparable esthetic beauty and far-ranging scientific significance. There are crystals in every conceivable colour, natural "abstract sculptures" in gold and silver, and stunning gems like the 17-carat sapphire from Kashmir that once belonged to a Russian duchess.



J.M. Carisse Photo

A vein of generosity: Viola MacMillan with Museum Director Alan Emery.

The Pinch collection rivals many institutional collections: whereas the Museum already owns samples of half of the world's 3500 known mineral species, the Pinch collection contains more than two-thirds.

The Pinch collection is the Museum's most significant acquisition and its most costly. But according to the experts, the Museum is getting an incredible deal. The collection is worth far more than $5 million: in fact, it is priceless, because it could never be reassembled. Pinch not only acquired many of the best pieces available, but many of his specimens came from mines that are now inaccessible, or out of operation.

The Museum hopes to complete the purchase of the collection by June 1990. Meanwhile, William Pinch has started another collection. Viola MacMillan continues to prospect for gold. Last year, she supervised a drilling program on a promising site in Timmins. She has also begun writing her autobiography.

The Viola R. MacMillan gallery will be a fitting tribute to a great lady, and a spectacular showcase for one of our most important industries.

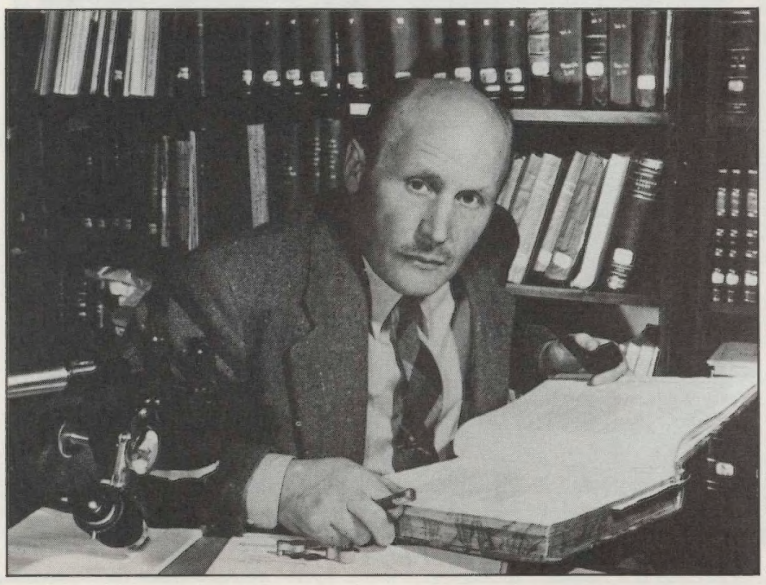
Cecilia Blanchfield

Glimpses of the Past:

A.E. Porsild (1901-1977)

By the time he entered his teens Alf Erling Porsild had already learned many of the skills he would use throughout his life. The son of world-renowned Danish botanist Morten P. Porsild spent much of his youth at a botanical research station in Greenland. When he was 11 he knew most wildflowers at the station by their scientific names. At 13 the budding scientist could drive sled dogs, speak Inuit and was proficient enough with a kayak to be invited on seal hunts with native Greenlanders.

After working as assistant botanist at the station from 1922-25, Porsild was convinced that there was still much to learn about arctic plant life. While he was planning an expedition to study Baffin Island plants, the Canadian government invited him to explore the possibility of grazing reindeer to provide food and clothing for the Inuit. He spent the next 10 years setting up and running a reindeer research station on the Mackenzie Delta — and studying arctic plants. The research for this project took him over much of northern Alaska, the Yukon and the Northwest Territories. And since the Inuit were not used to tending domestic livestock, Porsild himself went to Lapland to find herders to teach the Inuit. Everywhere he went he studied not only grazing possibilities, but also the overall natural history of the area.



National Film Board

After moving to Ottawa in 1935, Porsild began turning his studies into a stream of publications. In the next 40 years he produced more than 120 papers and books, including *The Vascular Plants of the Western Canadian Archipelago*, which was accepted as his doctoral thesis by the University of Copenhagen, and *Illustrated Flora of the Canadian Arctic Archipelago*, still considered to be his classic work.

In 1936 Porsild was appointed the Acting Chief Botanist at the National Museum of Canada. He began to enlarge the National Herbarium, collecting specimens in his travels and encouraging other botanists to do the same.

When World War II broke out, Porsild volunteered his services. He became Canadian vice-consul to Greenland in 1940 and in 1941 Georges P. Vanier, later to become Governor General, appointed him the Canadian consul to Greenland, describing Porsild's task as "a delicate and crucially important mission which only a man of Dr. Porsild's imagination and warm sympathy could have undertaken." Porsild was made a member of the Order of the British Empire for his efforts.

He returned to the Museum in 1943 and became Chief Botanist at the National Herbarium in 1946. The staff of the herbarium was small, and Porsild's duties included developing the herbarium, laboratory studies and field work. His studies took him to the Rocky Mountains, Alaska, the Yukon, the Mackenzie River, the Arctic Archipelago and even Siberia. In the next two decades Porsild's staff increased, and he was able to spend more time assimilating the backlog of specimens into the Museum's collections. By the time he retired in 1967, the collections under his care had grown from 120,000 to more than 430,000 specimens. His own collections included 81 plants new to science.

Porsild loved books, the outdoors and amusing stories. Although he earned a collection of international awards and honourary degrees — including fellowships from the Royal Society of Canada and the Guggenheim Memorial Foundation — he was always shy and unassuming. Although few Canadians knew of his accomplishments, the world knew Porsild as the authority on arctic botany.

He died in Vienna in 1977, but Porsild's fellow botanists gave him scientific immortality by naming 12 plants after him.

Joanne Laucius